

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

MAILED

Ex parte GEORGE S. BOKISA

APR 10 1997

PATENT OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Appeal No. 95-1549
Application 07/849,466¹

ON BRIEF

Before KIMLIN, GARRIS and THIERSTEIN, Administrative Patent Judges.

THIERSTEIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1 through 25, all the claims in the application.

Claims 1, 17 and 24 are illustrative of the subject matter on appeal and read as follows:

¹ Application for patent filed March 11, 1992.

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1. An aqueous acidic solution for plating tin, lead or tin-lead alloys on a substrate which comprises

(A) at least one bath-soluble metal salt selected from the group consisting of stannous salts, lead salts, or a mixture of stannous and lead salts;

(B) an acid from the group consisting of sulfuric or fluoboric acid; and

(C) at least one soluble bismuth salt of an alkane sulfonic acid or an alkanol sulfonic acid in an amount to provide a solution containing less than about 10 grams per liter of bismuth ions.

17. The plating bath of claim 12 wherein the bismuth salt (C) is prepared by dissolving bismuth oxide in an alkane sulfonic acid.

24. A method of electrodepositing tin, lead or tin-lead alloy on a substrate which comprises electroplating said substrate in the aqueous plating bath of claim 1.

The references relied on by the examiner are:

Nobel et al. (Nobel)	4,871,429	Oct. 3, 1989
Wilson	5,039,576	Aug. 13, 1991

The claims stand rejected as follows:

I. Claims 1 through 16 and 18 through 25 stand rejected under 35 U.S.C. § 103 over Nobel;

II. Claim 17 stands rejected under 35 U.S.C. § 103 over Nobel in view of Wilson.

We reverse.

OPINION

1. Background

As seen from independent claims 1, 12 and 21 on appeal, appellant's invention involves an aqueous acidic solution for plating alloys on a substrate. The solution in claim 1 comprises either sulfuric acid or fluoboric acid with a bath-soluble plating tin, lead or tin-lead salt(s) and at least one soluble bismuth salt of an alkane sulfonic acid or an alkanol sulfonic acid. The solution in independent claim 12 is essentially the same as claim 1 except that the bath-soluble metal salt is limited to tin. Claim 17, wherein the bismuth salt is prepared by dissolving bismuth oxide in an alkane sulfonic acid, depends from claim 12. Claim 21 is essentially the same as claim 12 with additional limitations on the amounts of each component in the bath or solution. Claims 24 and 25 are directed to a method of electrodepositing tin or tin-lead on a substrate using the solutions of claim 1 and claim 21 respectively.

Nobel teaches baths and methods for electroplating tin or tin-lead alloys. These baths contain soluble tin and/or lead metals as salts of alkyl or alkylol sulfonic acid, a soluble

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alkyl or alkylol sulfonic acid, at least one wetting agent, and a hydroxyl phenyl compound reducing agent to prevent or limit the formation of oxidized tin or sludge during electroplating. Nobel also teaches, generally, a soluble bismuth compound for use in these baths, especially naming bismuth nitrate as an acceptable example.

Nobel formulates plating solutions for tin and tin alloys prepared with metal fluoborates and free fluoboric acid wherein anti-oxidants are incorporated but teaches that "[i]n spite of the fact that the known anti-oxidants are incorporated into these fluoboric acid formulations, experience in high-speed plating applications has shown that large quantities of tin sludge are nevertheless formed during electrolysis." (Nobel, column 2, lines 3-7.) Numerous examples are provided in Nobel showing this undesirable oxidation of tin in tin plating formulations and rapid development of sludge in plating formulations using a fluoborate based mixture of tin and lead in a bath with an excess of free fluoboric acid (see Nobel, examples 1, 3 and 5).

The fluoborate-based baths are compared to the baths using free methyl or methylol sulfonic acid where oxidation of tin,

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present as a methane sulfonate salt, is substantially reduced and the build-up of sludge from the mixture of tin and lead, also present as methane sulfonate salts, is minimal (see Nobel, examples 1, 2, 4 and 6).

There is no mention of sulfuric acid in Nobel.

Wilson, column 5, lines 28-29, is relied upon by the examiner for teaching a preparation for a bismuth ion by a reaction of bismuth trioxide with methane sulfonic acid (answer, page 4, lines 6-7).

2. The § 103 Rejections

The first issue to be considered here is appellant's contention that the examiner has failed to establish a prima facie case of obviousness with regard to the rejection of claims 1-16 and 18-25 (brief, page 5, lines 14-15). In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992) ("If examination at the initial stage does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent." [Citations omitted.]).

A difference common to the plating baths disclosed in Nobel when compared to the plating baths of independent claims 1, 12

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and 21 is that in Nobel's baths each of (1) fluoboric acid and (2) methyl or methylol sulfonic acid or acid salt(s) is employed separately rather than together whereas the claimed baths contain a combination of (1) fluoboric acid and (2) alkane or alkanol sulfonic acid salt(s) of bismuth.

The court states in In re Geiger, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987) that "[o]bviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)."

The examiner fails to provide a specific teaching in Nobel to the claimed combination. Moreover, we find no teaching, suggestion or incentive in Nobel to modify the fluoboric acid containing baths it discloses by the addition of alkyl or alkylol sulfonic acid salt(s) or to modify the baths containing alkyl or alkylol sulfonic acid salt(s) by the addition of fluoboric acid. There is no rationale in the rejection that overcomes these deficiencies.

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In the absence of any support in Nobel for the claimed combination, the examiner states in the answer on page 4, beginning in the last line, that:

[I]t would be [sic: have been] obvious to one of ordinary skill in the art at the time the invention was made to use both alkane or alkanol sulfonic acid and fluoboric acid in tin plating baths of Nobel because it has been held to be obvious to use a mixture of two materials each of which has been used separately for the same purpose, In re Kerkhoven, [626 F.2d 846, 850,] 205 USPQ 1269 , [sic: 1069,] 1072 (CCPA 1980).

The examiner's reliance upon Kerkhoven shows a belief that the decision is relevant. We disagree. The court in Kerkhoven, 626 F.2d at 850, 205 USPQ at 1072 states:

It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose. In re Susi, 58 CCPA 1074, 1079-80, 440 F.2d 442, 445, 169 USPQ 423, 426 (1971); In re Crockett, 47 CCPA 1018, 1020-21, 279 F.2d 274, 276-77, 126 USPQ 186, 188 (1960). As this court explained in Crockett, the idea of combining them flows logically from their having been individually taught in the prior art. In the case at bar, appealed claims 2-4, 9 and 14 require no more than the mixing together of two conventional spray-dried detergents. Thus, these claims set forth prima facie obvious subject matter.

These are not the facts before us. Nobel provides both a teaching and evidence that the use of fluoboric acid in tin or

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tin-lead plating baths is associated with an undesirable formation of oxidized tin or of sludge from tin and lead. At the same time, Nobel contrasts this undesirable formation with substantially less of oxidized tin or sludge in baths using methyl or methylol sulfonic acid and acid salts. See appellant's statement that:

In fact, Nobel compares his plating baths with tin plating baths containing tin fluoborate and fluoboric acid (Examples 1A, 3 and 5) and demonstrates that the fluoboric acid containing plating baths provide undesirable results. [Brief, page 6, lines 1-3.]

One of ordinary skill in the art would not have found obvious the combination of a fluoboric acid containing plating solution exhibiting undesirable effects with an alkyl or alkylol sulfonic acid salt containing plating solution that minimizes these effects.

Our disagreement regarding the relevance of Kerkhoven continues in the face of the dissenting opinion.

The combination of the plating baths suggested by the dissent does not flow from the teachings in Nobel showing a difference in the precipitation for fluoboric acid and alkyl or alkylol sulfonic acid even at low temperatures in example 1.

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Clearly, the purpose of Nobel's disclosure is to contrast the effect of the named antioxidants in a comparison of the plating baths. The effect of the comparison is to view each plating bath as having different characteristics. As pointed out by the dissent, even at low temperatures one causes more precipitation than the other. One of ordinary skill in the art would not have combined a plating bath causing more precipitation with one causing less. Kerkhoven is not applicable on these facts.

Moreover, the dissent's position concerning the addition of bismuth in the form of a sulfonic acid salt is inapposite to the facts in Kerkhoven. At best under Kerkhoven a combination of the plating baths referred to by the dissent would accomplish a combination of fluoboric acid and alkyl or alkylol sulfonic acid. A second line of reasoning must be addressed to add a bismuth salt to the combination.

On this issue we also have a position contrary to that of the dissent. One of ordinary skill in the art would not have added a bismuth salt of an alkane or alkanol sulfonic acid in view of the teaching in Nobel cited by the dissent in the sentence bridging pages 13 and 14 that the bismuth compounds

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useful in the invention "are those which are water or solution soluble and the anion produced by the bismuth compound should not interfere with the tin or lead salts, such as causing precipitation thereof (column 8, lines 12-18)." As the dissent points out, at low temperatures EXAMPLE 1 in Nobel shows sludge is formed by the methane sulfonic acid anion in a tin plating bath. This would have led an ordinarily skilled artisan to expect that a bismuth salt of sulfonic acid would also form sludge and thus should not be used because it would "interfere with the tin . . . salts, such as causing precipitation thereof."

With respect to the claimed sulfuric acid, clearly, the examiner provides no teaching, suggestion or incentive to modify the baths of Nobel with this acid since there is no mention of the acid in Nobel.

Thus, notwithstanding the opinion of the dissent, we conclude that the examiner has not established a prima facie case of obviousness with regard to the invention of claims 1-16 and 18-25 on appeal.

With regard to dependent claim 17, we have reviewed the examiner's rejection of the claim under 35 U.S.C. § 103 over

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Nobel in view of Wilson. However, even if Nobel were modified by Wilson in the manner proposed by the examiner, the rejection would still be deficient for the reasons discussed above with respect to independent claim 12 from which claim 17 depends.

Accordingly, we cannot sustain the § 103 rejection of claims 1-16 and 18-25 over Nobel or the § 103 rejection of claim 17 over Nobel in view of Wilson.

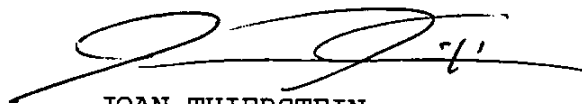
Because we reverse on the basis of failure to establish a prima facie case of obviousness, we need not reach the issue of the sufficiency of the showing of unexpected results. In re Geiger 815 F.2d at 688, 2 USPQ2d at 1278.

We reverse the decision of the examiner.

REVERSED


BRADLEY R. GARRIS

Administrative Patent Judge



JOAN THIERSTEIN

Administrative Patent Judge

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KIMLIN, Administrative Patent Judge, Dissenting:

I respectfully disagree with the conclusion reached by the majority. In my view, the examiner properly found that the claimed subject matter would have been prima facie obvious to one of ordinary skill in the art in view of the prior art of record, and that the Rule 1.132 Declaration by the present inventor, George Bokisa, does not establish unexpected results for the claimed invention.²

Like appellant, Nobel discloses an aqueous acidic solution for plating tin or tin-lead alloys which comprises stannous salts, an acid, a source of alkyl or alkylol sulfonate anions and a source of bismuth cations. Nobel does not expressly disclose the presently claimed bismuth salt of an alkane sulfonic acid or an alkanol sulfonic acid as the source of bismuth cation. In addition, although Nobel evidences that it was known in the art to use fluoboric acid in a tin plating solution, which fact is acknowledged in the present specification, the reference does not

² Although appellant submits at page 3 of the Brief that each of the appealed claims is considered to be separately patentable, appellant's Brief advances separate arguments for only claims 1-23, as a group, and claims 24 and 25, as a group.

disclose the combined use of fluoboric acid and a source of alkyl or alkylol sulfonate anions, as presently claimed.³ It is my opinion that these claimed distinctions would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the teachings of the prior art.

Regarding the claimed bismuth salt of an alkane sulfonic acid or an alkanol sulfonic acid, we agree with the examiner that, inasmuch as Nobel teaches plating solutions for tin or tin-lead alloys comprising bismuth cations and alkane or alkanol sulfonate anions, it would have been prima facie obvious to one of ordinary skill in the art to employ a bismuth salt of an alkane sulfonic acid or an alkanol sulfonic acid as the single source of both of the required ions. While Nobel exemplifies bismuth nitrate as the source of bismuth ion, the reference is not limited to such. Nobel teaches that bismuth compounds useful

³ We note that claim 1 on appeal defines the acid as one selected from the group consisting of sulfuric or fluoboric acid. Accordingly, claim 1 does not require the presence of sulfuric acid, i.e., claim 1 embraces plating solutions comprising fluoboric acid as the sole acid. That the examiner provides no teaching or suggestion to modify the baths of Nobel with sulfuric acid, as pointed out by the majority, is irrelevant to the rejection of the subject matter embraced by claim 1.

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in the invention to improve the low current density of the deposits "are those which are water or solution soluble and the anion produced by the bismuth compound should not interfere with the tin or lead salts, such as causing precipitation thereof" (column 8, lines 12-18). The obviousness of using the claimed bismuth salt of an alkane sulfonic acid or an alkanol sulfonic acid is further supported by Wilson's use of such (bismuth methane sulfonate) in a similar plating bath, as acknowledged at page 2 of appellant's specification.

I do not find that the Rule 1.132 Declaration of the present inventor establishes unexpected results for the claimed invention. The declaration is presented to demonstrate that, when the claimed bismuth salt of methane sulfonic acid is used instead of bismuth nitrate, an unexpected and significant improvement in thickness of the tin coating is realized at low current density. However, the probative value of the declaration evidence is not commensurate in scope with the degree of protection sought by the appealed claims. In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 778 (Fed. Cir. 1983); In re Clemens, 622 F.2d 1029, 1035, 206 USPQ 289, 296 (CCPA 1980). This is so

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because the comparative experiment of the declaration used sulfuric acid instead of fluoboric acid and, as noted above, sulfuric acid is not a requirement of the claimed solution. Appealed claim 1 encompasses a plating solution comprising fluoboric acid, and there is no evidence of record which establishes that, when fluoboric acid is used in conjunction with a bismuth salt of methane sulfonic acid, similar results occur. In addition, the declaration does not provide a comparison with the closest prior art. In re Johnson, 747 F.2d 1456, 1461, 223 USPQ 1260, 1264 (Fed. Cir. 1984). Nobel discloses the use of fluoboric acid and alkyl or alkylol sulfonic acid, not sulfuric acid. Furthermore, appellant has not established the statistical validity of the conclusion drawn from the declaration data. The declaration reports only a single comparative run. There is no evidence that the reported results are reproducible. We find this especially significant since Nobel and other prior art of record teach that bismuth nitrate improves the low current density of the deposits, and the declaration data shows virtually no improvement for a plating solution comprising bismuth nitrate as compared to a solution comprising no bismuth at all. Hence,

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the single test run offered by appellant produces a result that is contrary to the teaching of the prior art.

I also agree with the examiner that since Nobel discloses the use of either fluoboric acid or methyl sulfonate in plating solutions for tin or tin-lead alloys, it would have been obvious for one of ordinary skill in the art to utilize a plating solution comprising both fluoboric acid and methyl sulfonate or methane sulfonic acid. Much is made by appellant and the majority that Nobel shows that the use of fluoboric acid, unlike the sulfonic acid, results in the undesirable rapid development of sludge. However, when Nobel is read in its entirety, it can be seen that fluoboric acid only presents a sludge problem when employed in high-speed plating applications at elevated temperatures (see paragraph bridging columns 1 and 2). The table of Nobel's EXAMPLE 1 shows that fluoboric acid only causes a sludge problem at temperatures of 120°F and 140°F, but not at 80°F, which lower temperature, significantly, is approximately the temperature utilized by appellant in the plating methods exemplified in the present specification. According to EXAMPLE 1 of Nobel, when pyrocatechol is used as the antioxidant, less

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sludge (4.5%) is formed by fluoboric acid at 80°F than by methane sulfonic acid (5.5%). In my view, one of ordinary skill in the art would readily glean from Nobel that when plating at lower temperatures, as appellant does, one may employ fluoboric acid, methane sulfonic acid or a combination thereof without expecting the undesirable formation of sludge. In re Kerkhoven, 626 F.2d 846, 205 USPQ 1069 (CCPA 1980). Appellant's specification does not make mention of a sludge problem when using fluoboric acid and, based on the Nobel disclosure, this would seem expected by one of ordinary skill in the art due to the low operating temperatures of appellant's plating solutions.

The majority states that the "examiner fails to provide a specific teaching in Nobel to the claimed combination" of fluoboric acid and alkyl or alkylol sulfonic acid salts, and that they find no teaching, suggestion or incentive in Nobel to modify the disclosed baths by combining the acids in one bath (page 6 of decision). However, as stated by the court in Kerkhoven, 626 F.2d at 850, 205 USPQ at 1072, which is quoted by the majority, "[a]s this court explained in Crockett, the idea of combining them flows logically from their having been individually taught

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in the prior art." Manifestly, the combination of acids need not be taught by Nobel for a finding of obviousness. An incentive for the combination of acids would be the unavailability of a sufficient amount of one of the acids, or the higher cost of one of the acids.

The majority makes the point at page 9 of the decision that, since EXAMPLE 1 of Nobel shows that one bath causes more precipitation than the other, one "would not have combined a plating bath causing more precipitation with one causing less." I respectfully consider this a myopic view of the example's tabulated results. When the amount of oxidized tin generated in all solutions at 80°F is compared to the undesirable amount of oxidized tin produced at 120°F and 140°F by solutions comprising fluoboric acid, it can be readily seen that all solutions, including those comprising fluoboric acid and either antioxidant, generate acceptable levels of oxidized tin.

I disagree with the majority that my "position concerning the addition of bismuth in the form of a sulfonic acid salt is inapposite to the facts in Kerkhoven" (page 9). I do not cite Kerkhoven in support of the obviousness of adding the claimed

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bismuth salt. Also, merely because Kerkhoven is not on "all fours" with the facts of the present case does not mean that the principle espoused therein is not apposite for the proposition for which I applied it, viz., the combination of the relevant acids in the plating solution. Certainly, the majority does not mean to suggest that Kerkhoven is applicable only when there is just one distinction between a claimed invention and the prior art.

Regarding the majority's view that the skilled artisan would have expected a bismuth salt of sulfonic acid to form sludge due to Nobel's example at low temperatures, I again point out that one would have gleaned from the example that the amounts of sludge produced at low temperatures are acceptable. I emphasize that appellant's specification is not directed to the prevention of sludge, and there is no assertion by appellant, let alone any evidence of record, which indicates that appellant's plating bath, at low temperatures, generates any less sludge than that amount which would have been predicted by the example of Nobel.

For the above stated reasons, I find that the claimed subject matter would have been obvious to one of ordinary skill

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in the art and, therefore, I would sustain the examiner's
rejection.

Edward C. Kimlin

EDWARD C. KIMLIN

Administrative Patent Judge

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